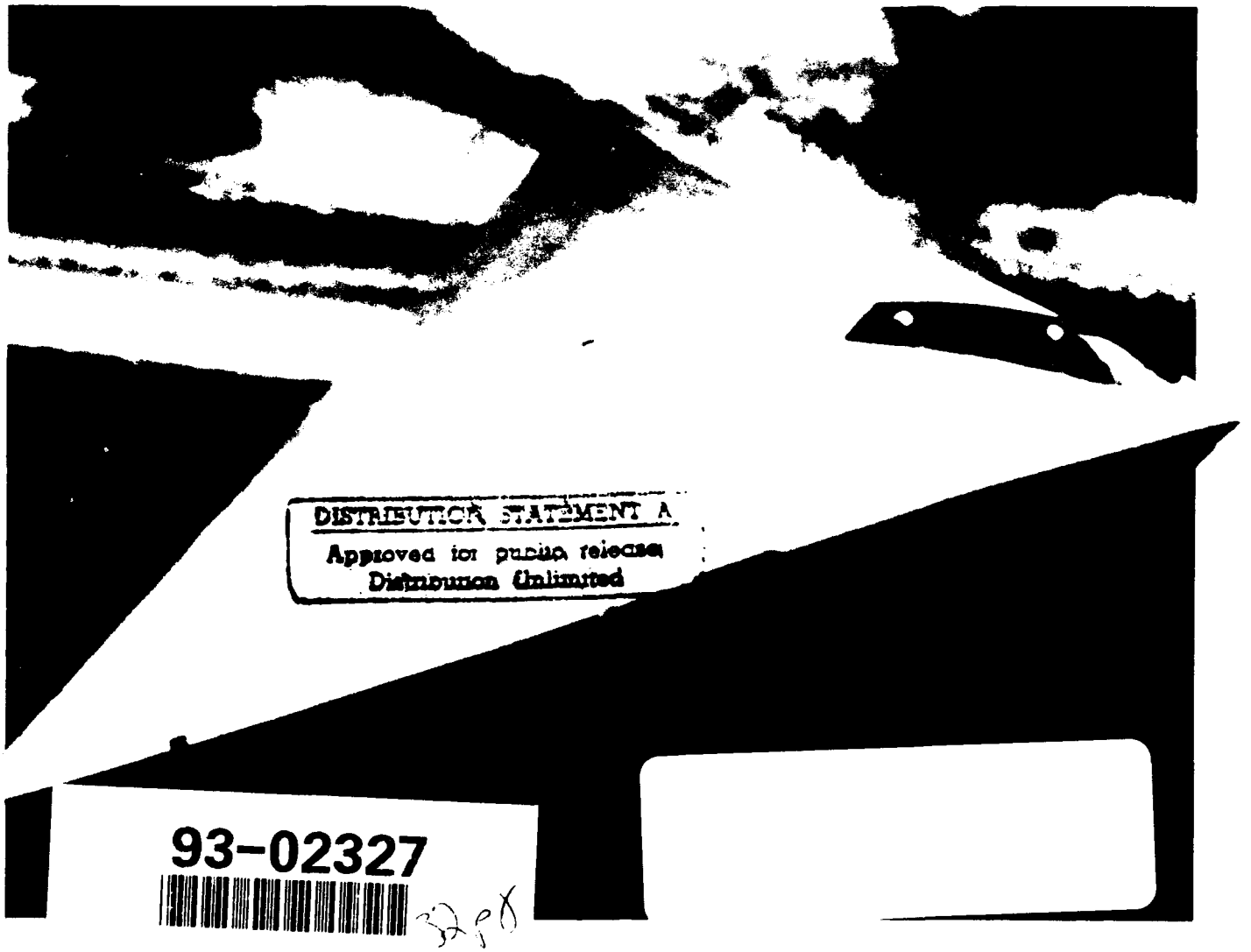
January-February 1993

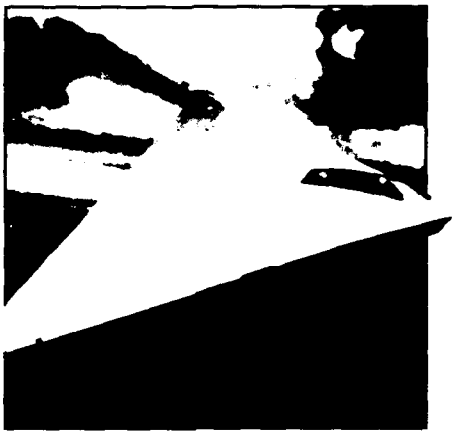
13

Journal of the Defense Systems Management College



Journal of the Defense Systems Management College

VOL. XXII, No. 1, DSMC 112



Getting to the (Right) Bottom Line

Dr. Paul A. Ballou, Jr.
Bert A. Milliken

How can the government and the contractor negotiate contracts to satisfy needs of both parties?

Career Counseling During the Drawdown

Major Jody V. Rennie, USAF

Problems created by downsizing are significant for individuals and organizations.

Game Theory in the Procurement of Major Weapon Systems

Lieutenant Colonel Michael E. Heberling, USAF
Major T. Scott Graham, USAF

A look at conflicting interests and options for defense contractors and the government.

Lean Production

Lieutenant Colonel Leslie Anderson, USAF

The transition from mass production is not painless or fast.

Program Manager (ISSN 0199-7114) is published bimonthly by the Defense Systems Management College, Fort Belvoir, VA 22060-5426. Nongovernment employees and organizations may subscribe at $9.50 annually through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Second class postage paid at Fort Belvoir, VA, and at additional entry offices.

POSTMASTER: Send address changes to *Program Manager*, Defense Systems Management College, Fort Belvoir, VA 22060-5426.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402

Whenever in this publication "man," "men," or their related pronouns appear, either as words or parts of words (other than with obvious reference to named male individuals), they have been used for literary purposes and are meant in their generic sense.

On the Cover:
An artist's rendering of the A-12.

Advisory Panel Formed

Donald M. Freedman

Streamlining and codifying acquisition laws.

The American Golden Rule: Past and Present

John F. Leonard

Be prepared for cuts in the federal budget.

Program Manager is intended to be a vehicle for the transmission of information on policies, trends, events, and current thinking affecting program management and defense systems acquisition.

Statements of fact or opinion appearing in *Program Manager* are solely those of the authors and are not necessarily endorsed by the Department of Defense or the Defense Systems Management College. Unless copyrighted, articles may be reprinted. When reprinting, please credit the author and *Program Manager*, and forward two copies of the reprinted material to the Director of Publications.

To subscribe, government personnel should submit written requests (using their business addresses) to the Director of Publications.

Manuscripts and other correspondence are welcome and should be addressed to the Director of Publications. Inquiries concerning proposed articles may be made by phone at (703) 805-2892/3056 or DSN 655-2892/3056.

GETTING TO THE (RIGHT) BOTTOM-LINE

Paul O. Ballou, Jr., D.P.A.

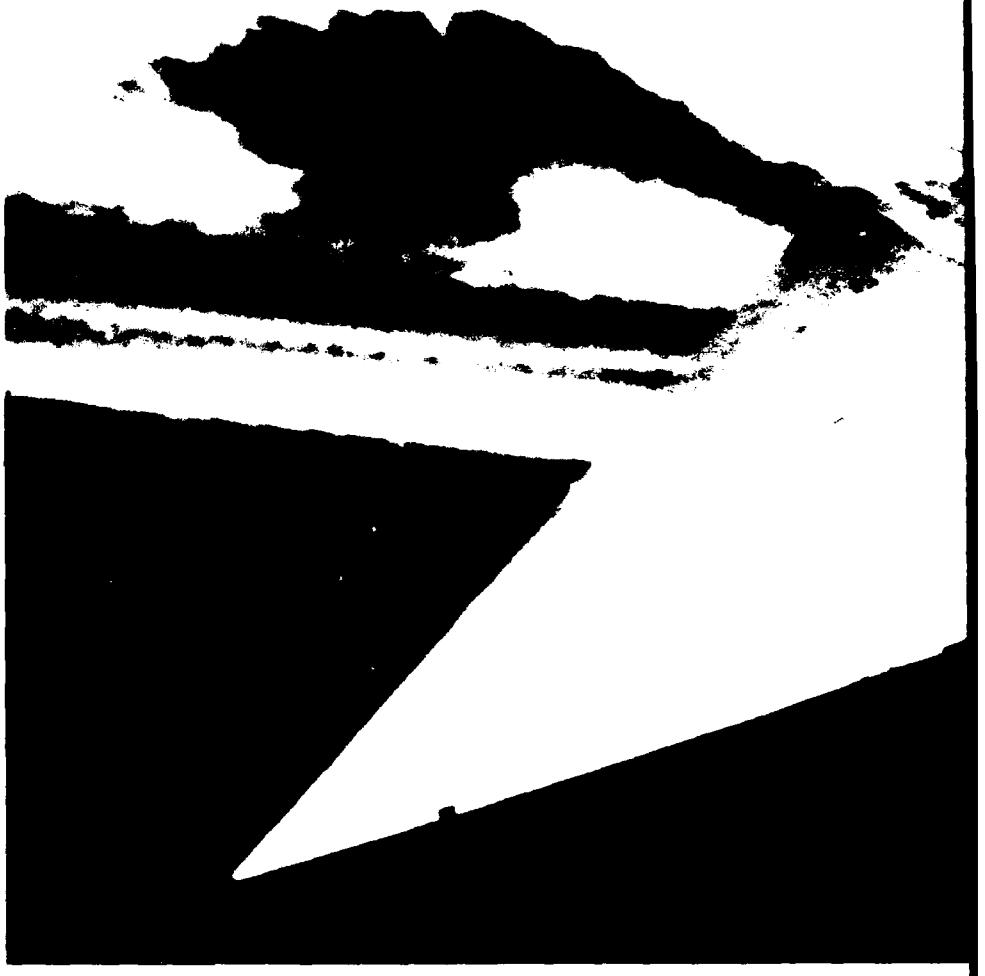
Bert A. Milliken

Reviewing the book *Deterrent or Defense* by British military historian B. H. Liddell Hart, President John F. Kennedy praised the author's recommendations for negotiation:

> Keep strong if possible. In any case, keep cool. Have unlimited patience. Never corner an opponent, and always assist him to save his face. Put yourself in his shoes—so as to see things through his eyes. Avoid self-righteousness like the devil—nothing is so self-binding.

In the acquisition of major systems many problems are encountered. Some are negotiated skillfully and others are not. A breakdown of the acquisition system usually relates from a previous failure to apply the basic precepts of negotiation.

An example of how *not* to negotiate was *program cancellation* of the A-12 Avenger aircraft, which was to have been the Navy's next superplane by 1994. Once the centerpiece of future carrier air wings, the A-12 was terminated for default because of overruns and development delays. Secretary of Defense Dick Cheney terminated for default the $4.8 billion ceiling price development contract January 7, 1991. The contractor team, a joint venture of McDonnell Douglas and General Dynamics Corporations, comprises the two largest defense contractors in terms of the dollar value of contract awards in fiscal 1990.



The contractor team filed suit in the U.S. Claims Court, Washington, D.C., challenging the Navy's default termination of the A-12 aircraft program. The complaint alleges the government used a fixed-price type development contract in violation of law and regulations, set specifications it knew were unattainable, failed to provide critical data, interfered with the contractors'

Dr. Ballou is a professor of systems acquisition contracting at the Defense Systems Management College.

Mr. Milliken is chief of the Contracting Policy Division, Headquarters, U.S. Army Corps of Engineers.

- **COMPETITIVE (WIN/LOSE)**
  - Tough demands
  - Control
  - Emotional
  - Adversary
- **COOPERATIVE (WIN/WIN)**
  - Organizational
  - Personal
  - Attitude
  - Mutual satisfaction

Artist's rendering of A-12.

ability to perform, and failed to apply available funds to execute the contract as required.[1]

No one could tell Secretary Cheney exactly how much more it would cost to keep the program going, and he did not believe a bail-out was in the national interest. Secretary Cheney said, "If we cannot spend the taxpayer's money wisely, we will not spend it." The contractor team had proposed absorbing part of the losses on the current contract, and charging the majority of the loss against future production contracts. The team also would waive $1.6 billion in claims to continue the program. Secretary Cheney was unwilling to ask the Congress for more money.[2]

The Navy need for an A-12 type aircraft was, and remains, an urgent requirement. A new procurement action is in process to acquire a new AX aircraft in lieu of the A-12. The first AX aircraft is not intended to reach the fleet until about 2005, and is expected to cost $10 billion on top of the $5 billion spent on the cancelled A-12.[3] The new program will require extensive new investment in design, development, test and production, redundant of effort completed by the A-12 program. Of more concern now to our national defense capability is that the Navy must rely on its aging fleet of A-6 Intruder aircraft. A substantial investment will be required to extend the operational life of the 30-year-old A-6s.

An example of how *not* to negotiate was *program cancellation* of the A-12 Avenger aircraft, which was to have been the Navy's next superplane by 1994.

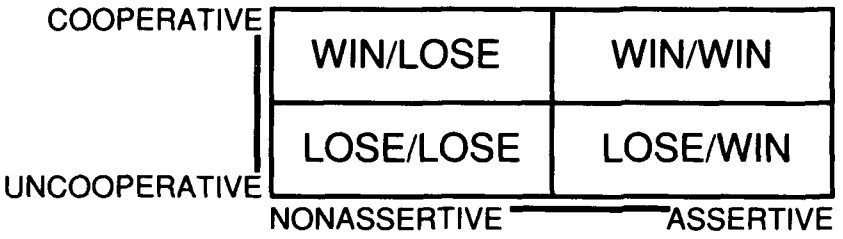
Cost impact of the default termination will not be known for several years. The contractor team's suit is expected to be tied up in court for 8 years. If team allegations are proved true, the default will revert to a convenience termination. This potentially will cost the Department of Defense and the taxpayers billions of dollars in administrative cost of termination, and reimbursement of cost incurred under the contract.

The A-12 situation is the result of a lose/lose negotiation in which, no matter what happens, all parties will be worse off because of termination. We cannot expect the parties will be made whole. So, the purpose of the termination was not to win in the sense of receiving a positive gain but, rather, to minimize total losses and ensure the contractor team does not benefit.

Modes of Negotiation

The fundamental question is: How can the government and contractor negotiate contracts to satisfy needs of both parties? Figure 1 outlines modes to conduct negotiations. When negotiating is misperceived as a win/lose game, objective for negotiations often fail after a "successful negotiation." Cooperative negotiation results in an agreement with an integrative solution that best meets needs of both parties, and secures their commitment to fulfill the agreement.

Negotiations can be conducted in competitive or cooperative modes. Competitive negotiation involves one side achieving its objectives while preventing the other side from reaching theirs. Competitive negotiators view the negotiation as a zero sum game. If I win, you lose. In reality, win/lose agreements usually result in a lose/lose agreement in the long term. This



concept of rivalry involves using tactics such as making extreme demands and threats, employing negotiation games, and using power to achieve objectives. The antagonistic relationship reaches a point when the two parties and, perhaps more importantly, individuals involved, regard each other as adversaries. Consequently, the parties are concerned with saving face. This does not allow for trust and openness to achieve a synergistic agreement and, therefore, the agreement reached will not reflect needs and interests of both parties. This adversarial relationship will continue during contract performance.

The cooperative mode of negotiating allows both parties to satisfy their needs and interests, and has the support and commitment of participants. Problems are defined in terms of organization needs with an in-depth effort to identify solutions to meet these needs. Personal aspects needing to be developed during negotiation are trust, friendship and lasting relationships, which are the foundation to successful agreements. Integrity and creditability underpin the attitudinal relationship, resulting in a commitment. When problems arise after the contract is signed, the parties will work together to solve them in the best interest of the program.

The mode of negotiation is critical. Most teaching and written material regarding negotiation have emphasized the competitive mode: assessing one's relative power and skillfully using that power to arrange the best possible outcome for one's side. This implies there must be a winner and a loser. When one uses power to coerce the other, there is resentment and instability in the relationship. The losing party's compliance with such a bad agreement is doubtful; whereas, in the cooperative mode, both are committed to future compliance.

Lose/lose negotiation often is perceived as a response to a "two dogs, one bone" conflict or a "minimize the risk" situation.

Negotiation Styles

Contract negotiations involve a communications process whereby two or more parties with different or opposing positions resolve a problem of mutual concern; an integrative solution best meets needs and interests of the parties, securing their commitment to fulfill the agreement. Figure 2 shows how modes of negotiation are influenced by major variables that influence the results.

The following alternative approaches are used in contract negotiations. The approach used generally results in the response indicated, depending upon the nature and environment of the situation.

Approach	Response
Avoidance	Nonassertive and uncooperative
Compromise	Nonassertive and cooperative
Competition	Assertive and uncooperative
Integrative	Assertive and cooperative

Cooperation in negotiation involves willingness to work together toward a common objective; e.g., a mutually beneficial contract or contract modification. Assertive communication involves willingness to state needs and interests honestly and specifically to resolve problem areas without being aggressive.

Each negotiation is unique. Many factors influencing the outcome include: extent of the parties, preparation, background and experiences of negotiators, and perception of other parties power and position.

Lose/lose negotiation often is perceived as a response to a "two dogs, one bone" conflict or a "minimize the risk" situation. One party maximizes its position by relying on power and authority, failing to recognize the other party's power to undo a solution through indifference or sabotage. A win/win approach to negotiations is assertive and cooperative to a high degree. Negotiators explore problem areas to identify both parties underlying interests and needs, and develop alternatives to meet their concerns. Common interests are identified and built upon. Clearly, the best approach for resolving conflicts is recognizing needs and interests between parties and cooperating to meet mutual interests. In cooperative negotiations, both parties reach an integrative solution, and are willing to commit to fulfilling the agreement, thereby forming a long-term relationship.

Interests and Needs

Meaningful negotiations occur only when there is an opportunity for interchange between parties. Most of us see the difference between positions as the problem. Therein lies the failed potential of negotiation. Interests behind a problem are crucial. An example is two men quarreling in a library. One wants the window open and the other wants it closed. No agreement is reached about the window until the men recognize underlying interests; one wants fresh air and the other does not want a draft. The integrative problem solving agreement is to open a window in the next room to bring in fresh air without a draft.

Asking "why" or "why not" are useful questions to uncover interests and needs of parties in a negotiation. For example, asking Secretary Cheney regarding the A-12 negotiation: "Shall I cancel the program or not?" the following may have been his replies.

IF HE SAID

YES	NO
Appeared strong	Appeared weak
Stopped wasteful spending	Was wasting taxpayers' money
Broke bail-out precedent	Was bailing out contractor
Appears to be under control	Appears to be out of control

From Secretary Cheney's point of view, program cancellation was the only logical decision.

Identify Problems

The A-12 full-scale development contract was awarded Jan. 13, 1988, to the contractor team. Progress reports indicated the contractor team was having engineering setbacks, production slippages, program delays, and cost and weight growths. All development contracts anticipate problems during performance that must be resolved by the parties for program success. A few specific problem areas identified during the A-12 development effort were aircraft weight, aircraft range, government-furnished information, government review and approvals, and constructive changes. These problem areas, not unique to the A-12, can be found in any aircraft development program. Effective preparation for negotiation requires parties to conduct an analysis of each problem, first determining the facts. Second, the problem must be diagnosed with causes and barriers clearly understood. Third, after potential solutions are identified, possible actions are sought. Last, after considering strengths and weaknesses of parties positions, they need to identify alternatives and select a course of action to resolve the problem.

1. Problem arises
2. Each party perceives problem
3. Each party develops list of needs/interests
4. Both parties discuss needs/interests
5. Both parties generate solutions
6. Joint selection of integrative solutions

Reaching Agreement

In the United States we have been taught the concept of competition, which underlines much of our legal system. In negotiations where each party expects the other to act as an adversary, both become victims of a self-fulfilling prophecy. Lack of trust resulting from such behavior can lock people into positions where they tend to minimize risk rather than maximize gain. Successful negotiations are built on understanding the process. See Figure 3.

The process depicts an open-ended model for resolving problems. The only limitation on parties to solve problems is their willingness to search for an integrative solution and take responsibility for results of their actions. A negotiator should always maintain the parties principles. It is improbable that an honest person will be drawn into questionable agreements. Remember Liddel Hart? "Never corner an opponent, and always assist him to save his face. Put yourself in his shoes—so as to see things through his eyes. Avoid self-righteousness like the devil—nothing is so self-binding."

In cooperative negotiations, both parties reach an integrative solution, and are willing to commit to fulfilling the agreement, thereby forming a long-term relationship.

Endnotes

1. *Federal Contracts Report*, 6-17-91.
2. *Federal Contracts Report*, 1-14-91.
3. *Aviation Week & Space Technology*, Sept. 9, 1991.

CAREER COUNSELING

Major Jody V. Rennie, USAF

During this period of significant changes in the Department of Defense (DOD), many organizations are dealing with "getting through 1993." In this article, I focus on one DOD change: force reduction. Examples come from the impact of the drawdown on Air Force military members in the acquisition community, but the counseling suggestions, people skills and problem-solving techniques apply to many organizations.

How to handle drawdown impacts within the organization is a major issue managers face. Individual concerns are: Should I take the money and run before I'm "asked" to leave? If I'm selected involuntarily, am I a failure? How will I care for my family? Where and when will I find another job? Organizational concerns are: Who'll be left to do the work? When and how will we find replacements? Should we have new concerns about who has access to sensitive information? How do we retain good people? These issues result in many classic management problems.

Numerous approaches were taken by organizations to "get through 1992," some effective, others not. After listening to various approaches and how they were perceived, I consolidated ideas that seemed to work for the Air Force acquisition community, and developed an outline of actions to keep the organization vital and to serve individual needs. I talked with peers, visited Consolidated Base Personnel Offices (CBPOs), read books on firing and layoffs in the private sector, and reviewed basic management texts. Clearly, organizations that cared for people fared better than those that didn't.

The basis of successful approaches are management tools that often are forgotten during day-to-day "fire fights." These tools—performance and career counseling, conflict management, managerial style and temperament, motivational techniques, communication styles and time management—are taught in most M.B.A. degree curricula, Service schools and the Defense Systems Management College. Even though most managers constantly use many of these skills, it is easy to fall into the habit of using only skills that come easiest and are needed for survival. Learning to do something new takes time.

Organizations, where leadership initiated dialogue concerning the future, seem to have the best morale. This isn't surprising; lack or miscommunication of information often is cited as a major reason for conflict. Providing current information does two things for the manager. First, subordinates will hold in high regard the manager who provides current information. Secondly, when a manager learns of concerns, he can act to improve or correct them.

Date	Considered	Selected	Percent
Nov 88	1958	377	19
Dec 90	2423	712	29
Jan 92	3322	979	30
Jun 92	2153	645	30
Total	**9856**	**2713**	

Methods providing information and

Major Rennie is a graduate of PMC 92-2, Defense Systems Management College. She is a TAF Acquisition Officer, NGB/AQ.

dialogue are military calls, counseling sessions and organizational meetings. Many object to these "meetings" taking up time, when they are already trying to do more with less. Another view of this issue is: Can leadership have everyone doing their own research, reacting to rumors today, and drawing their conclusions instead of focusing on mission tasks at hand? Isn't it more effective to provide information in an open forum and encourage open sharing of information rather than have each person calling his personnel office to discover the "truth?"

Officers, Board met July 20, 1992
Selected, 1,595 reserve officers of 8,923 considered
18 percent selection rate

Military Call

A military call is a way to provide much information rather quickly to many people. Its goal is for each person to look hard at the current situation, evaluate performance and begin the difficult, and sometimes painful, process of determining the "what ifs" and the "what then." Self-assessment is difficult but the leader who encourages this, before the boards meet and letters are sent, can prepare subordinates for what may come.

Selective Early Retirement Boards (SERB) results for current drawdown (started in 1987), are shown in Table 1; WHAT results are shown in Table 2.

Individual Counseling

Most supervisors think individual counseling is important but many never seem to have time to complete it. Whets Smith in *Taking Charge* says "A leader of an organization should have private sessions with immediate subordinates about once every six months to deal specifically with performance counseling."[1] It would seem, then, that during these sessions, career counseling should be included. Career counseling always has involved risk as subordinates looked to leadership for "divine" insight. To be effective, the supervisor must consider not only the written record, but the individual's nature, personality and temperament. The Myers-Briggs Type Indicator is one tool available to managers to help determine the best way to communicate with someone. *Type Talk at Work*, by Otto Kroeger with Janet Thuesen, provides information on how to approach personalities in various circumstances. For career counseling to be effective, communication is essential and requires the counselor to recognize that people do not process information or think alike.

The method of counseling is important. Career counseling can be either directive or nondirective. Using a directive style, the supervisor gives advice, a "pep talk," and tries to give reassurances for the future. Using the nondirective style, the supervisor acts as a sounding board while the member talks about the situation, discusses his concerns, and considers implications of the problem.

The four stages for an effective nondirective counseling session are: setting the environment, getting people to talk, helping them think it through, and letting them find the solution. In practice, this probably is the better approach for career counseling, given that decisions are ultimately up to the individual.

To learn on what people who were at high risk for the 1992 officer reduction in force (RIF) were basing their decisions, I contacted a spokesperson responsible for FY 1992 exit bonus programs at Bolling Air Force Base, Washington, D.C.[2] He said some at high risk for the RIF elected not to take a bonus because their records were "great." Some had their perception of "great" and others were told how great they were. As it turns out, their records were not stellar and many were RIFed.

Often, supervisors don't know how or don't want to tell individuals they aren't top-rated. They assume "everyone" knows what a competitive performance looks like. Individuals don't always know and, after all, their performance reports say they are great. Another instance, an individual was told by her supervisor, "I can get you promoted, but I don't think I can save you from the WHAT, which will be first." Although that sounded like a backhanded compliment, it gave the individual the needed information to make an informed decision about the future.

Another supervisor called military personnel together and recommended we assess our position and determine if we think we can survive a WHAT or SERB. Kathleen Riehle advises in

What Smart People Do When Losing Their Jobs, "First, and most important, regardless of how important you believe you are to the company, always prepare for the worst and assume you are on the list."[3]

Some individuals relied on advice from retired relatives and friends who didn't understand the severity of this drawdown. No one can force someone to accept reality, but providing incorrect advice to spare a tough moment, or relying on history doesn't help a situation.

Supervisors can confirm their perceptions of how subordinates compare to peers by joining other base units in a program of reviewing personnel records of people eligible for SERBs and RIFs.

The supervisor will be asked about alternatives during career counseling. A reference list of local on- and off-base support organizations would be helpful. The *Air Force Times* accurate and timely information proved helpful to me and reportedly published accurate information before the Consolidated Base Personnel Office during FY 1990 activities.

Another challenge of the drawdown is maintaining morale. The management team needs to discuss the working environment, because people have left and more will be leaving during the next few months. The work-load increase brings new conflicts within the organization. In addition, many members of the management team are concerned with their futures. The management team needs to understand emotions associated with losing or ending a career, find ways to recognize people who are leaving, and motivate the remaining work force. Conflict is increasing because of uncertainty, and the team is losing harmony as people depart. Nominal group technique, group decision-making and creative problem-solving techniques can be employed to develop ideas.

All organization members, especially division chiefs, should be educated about the variety of reactions people have when experiencing job loss. "Predicting how a given person might respond is tricky at best, although if a manager has observed the person's reaction to some similar high-stress loss situation (which usually is not the case), the person is likely to exhibit the same defense mechanism."[4] A review of personality and temperament types may help avoid rough spots. Knowing that not everyone reacts the same may help people understand what is happening to others around them.

As people leave the Air Force, by choice or requirement, a variety of reactions will occur. In *Dismissal-There is No Easy Way-But There Is a Better Way*, by William Morin and Lyle Yorks, four common reactions to dismissal are identified: defensive but pragmatic, anticipatory, aggressive/hostile, and withdrawal/denial.[5] This may be applicable to some who took the early-out because they felt there was no real choice.

The most common reaction is defensive but pragmatic. The person is angry, frustrated, resentful and expresses concern about pragmatic issues. "What is next?" "What is the Air Force going to provide for me?" "How long do I have to find a job?" "The subsequent reactions of such individuals will be strongly shaped by whatever conclusions they arrive at following an attempt to assess their next career steps."[6] The member will complain to coworkers about the inequity and unfairness of the situation. However, these individuals are concerned about their continued survival and will press on to find solutions.

Another common reaction is anticipation. "These people expect termination but hope to delay it."[7] There are cases where individuals didn't keep appointments for mandatory counseling before the WHAT. They seemed to think if they didn't sign the letter acknowledging the upcoming WHAT, they would be safe. Morin and Yorks state that once the bad news is given, people with this reaction are often relieved and want to learn about available benefits.

The hostile/aggressive reaction can be argumentative or violent. Argumentative persons will threaten lawsuits and accuse others of the wrong done to them. We must let this type vent frustration and not engage in arguments. The violent reaction is rare, according to Moring and Yorks; and, usually, the individual calms down by putting energy into positive actions.

The final reaction is withdrawal or denial and is, perhaps, the most difficult. During the one-on-one session,

Mr. Norman Augustine, Chairman, Martin Marietta Corp.

the member is quiet, disbelieving, euphoric and calm. This may be interpreted as "professional" or mature. However, according to Morin and Yorks, it usually means the person hasn't accepted the situation. "Individuals who react in this way (quiet) are often the ones who do the most damage to the organization and/or themselves."[8] Once reality sets in, these people often explode. Management needs to ensure the person understands what has happened. Those who appear to not believe this is happening to them also should be of concern. "Of all the reactions, this can be the most frightening to deal with. The boss needs to try to keep the conversation going, to draw out these people. Some sort of reaction—perhaps negative, or at least accepting—needs to be elicited before the end of the interview."[9] Those responding euphorically probably are not accepting the situation. Often, this is a sign of disorientation and, in reality, these individuals have no idea what to do next.

The points made by Morin and Yorks are interesting when applied to the Air Force today. It is important to remember, especially when dealing with those selected for early retirement of WHAT, that there is more than just a paycheck involved. These men and women have contributed to the Air Force for some time. Telling people "Your services are no longer needed" puts their pride and self-worth at risk.

This brings out the next important issue: We need to ensure that members leaving are thanked for their services. *The Air Force Times* interviewed people who left the military service for one reason or another,[10] and several said they had not received a simple "thank you." Our management team needs to focus on how we give each person the attention deserved despite the number leaving in a short time. The management group will address how to keep remaining people motivated. At this point, everyone is fearful for their jobs and are tired of doing more with less.

Giving SERB/WHAT Results

Research on dismissal interviews was enlightening. Most Air Force officers haven't been given much training on how to tell someone "Your services are no longer required," especially when it means the member must leave the Service involuntarily. During the 1992 WHAT, the Air Force Military Personnel Center provided a package that provided sample letters and answers to anticipated questions. Each interview must be well-thought-out in advance, because once the board results are released, the interviews must be conducted quickly. It would be extremely inappropriate for the member to learn the results from any other source.

Of course, most people will not identify all of their concerns moments after being told their Air Force career is complete, but the tone of this first session will largely determine their relationship in the organization for the time remaining. In their book, Morin and Yorks recommend a dismissal interview follow these steps: 1) Get to the point; 2) Describe the situation; 3) Listen, don't be defensive; 4) Discuss the support package; 5) Specifically define the next step.[11]

It is essential that each person whose records were considered by a board hear the results—good or bad. Privacy, confidentiality and sufficient time are keys to maintaining individual dignity and organizational morale. In one colleague's office, the rumor was: If you received a phone call to report to the boss before noon of the next day, results had already been released and you had been RIFed. Many tense people waited by their phones. The phones, by the way, rang all morning with outsiders trying to conduct business. Not much effective business took place.

Conclusion

Problems created by downsizing are significant and affect not only individuals, but the daily working of the organization. By using sound management and leadership practices, commanders can reduce and mitigate the impact. The Air Force, as an institution, has done many things right during this downsizing period, by offering good severance packages and providing advance information. It is up to the leaders in the field to use their leadership talents to relate to their people. It is their responsibility to advise and counsel and deliver good and bad news. When everyone is reacting to a turbulent environment, it is more important than ever to treat our most important resources, people, with the dignity and thanks they deserve.

Endnotes

1. Smith, Whets M., *Taking Charge*, Garden City: Avery Publishing Group, Inc., 1988.

2. Resink, 2Lt., interview with author, Bolling Air Force Base, Washington, D.C., October 9, 1992.

3. Riehle, Kathleen, *What Smart People Do When Losing Their Jobs*, New York: John Wiley and Sins, Inc., 1991.

4. Morin, William and Lyle Yorks, *Dismissal - There is No Easy Way - But There Is a Better Way*, New York: Harcourt Brace and Jovanovich Publishers, 1990.

5. *Ibid.*

6. *Ibid.*

7. *Ibid.*

8. *Ibid.*

9. *Ibid.*

10. *Air Force Times*, November 9, 1992, pp. 14-18, 36.

11. Morin, William and Lyle Yorks.

ADVISORY PANEL FORMED

Donald M. Freedman

Section 800 of Public Law 101-510 (the National Defense Authorization Act for FY 1991) directed the Department of Defense (DOD) to establish an advisory panel sponsored by the Defense Systems Management College (DSMC). The purpose of the panel was to review acquisition laws applicable to the Department of Defense (DOD), with a view toward streamlining the acquisition process.

According to the law, "the panel shall be composed of at least nine individuals who are recognized experts in acquisition laws and procurement policy. In making appointments to the advisory panel, the Under Secretary of Defense (Acquisition), USD(A), shall ensure that the panel reflects diverse experience in the public and private sectors."

Section 800 of Public Law 101-510 describes the panel duties as follows:

> (1) review the acquisition laws applicable to the Department of Defense with a view toward

---

Mr. Freedman is executive secretary to the DOD Advisory Panel on Streamlining and Codifying Acquisition Law at the Defense Systems Management College.

streamlining the defense acquisition process;

(2) make any recommendations for the repeal or amendment of such laws that the panel considers necessary, as a result of such review, to-

(3) prepare a proposed code of relevant acquisition laws.

Advisory Panel Organization

In April 1991, The USD(A) nominated 13 individuals to serve on the DOD Advisory Panel on Streamlining and Codifying Acquisition Laws. The Advisory Panel is noteworthy in that its members are not people whose names would be recognized by the general public. The members are all recognized experts in the field of DOD acquisition and its associated legislation. They deal with the acquisition process daily. There is a good balance between government and industry, and between acquisition policy and procurement law.

The Chairman of the Panel is RADM W. L. Vincent, Commandant of the Defense Systems Management College. There are six Panel members from the public sector.

Organization - Public Sector Panel Members

Panel Chairman

Rear Admiral W. L. Vincent, Commandant, DSMC

Pete Bryan	Director, Contract Policy and Administration, OUSD(A)
Allan Burman	Administrator, Office of Federal Procurement Policy
Anthony Gamboa	Deputy General Counsel, Dept. of Army (Contracting)
Gary Quigly	Deputy General Counsel, Defense Logistics Agency
Maj Gen John Slinkard	Deputy Chief of Staff (Contracting), HQ Air Force Material Command
Harvey Wilcox	Deputy General Counsel, Dept. of Navy (Logistics)

In addition to seven members from the government, there are six members from the private sector.

Organization - Private Sector Panel Members

Jack Harding	Vice President, Contracts, Raytheon Corp.
LeRoy Haugh	Vice President, Procurement & Finance, Aerospace Industries Association
Thomas I. Madden	Partner, Venable, Baetjer, Howard and Civiletti
Ralph Nash, Jr.	Professor of Law, George Washington Univ.
F. Whitten Peters	Partner, Williams and Connolly
Robert D. Wallick	Partner, Steptoe and Johnson

Three from government and four private-sector Panel members are practicing attorneys. Private industry is represented by an individual from an industry association and an individual from a major defense contractor. The private sector also has a representative from academia.

Although USD(A) nominated Advisory Panel members in April, their first

meeting was not until September 5, 1991. This was largely due to a requirement to comply with provisions of the Federal Advisory Committees Act (FACA), which requires extensive documentation before Panel members can serve. The approval process took more than 5 months.

At its first meeting, the Panel decided to focus on the following six functional areas:

—Contract Formation
—Contract Administration
—Other DOD Acquisition Issues
—Socioeconomic Issues
—Intellectual Property
—Standards of Conduct.

The Panel established a working group for each of these areas. Each working group consists of two Panel members (one from the public and one from the private sector).

Preliminary Research

During the time before the first Advisory Panel meeting, RADM Vincent established at DSMC a cadre who conducted preliminary research to aid the Panel in starting up quickly. One task assigned to the DSMC cadre was identifying the universe of laws the Panel needed to review.

Through the years, there have been several attempts to define the universe of laws relating to DOD acquisition. In the early 1970s, a study identified more than 4,000 statutory provisions (Public Laws and U.S. Code sections) applicable to DOD. However, this data base was too outdated for the Advisory Panel to use for its purposes.

A second data source was a report entitled "Laws Relating to Federal Procurement." Biannually, the House Armed Services Committee prepares this report identifying many of the statutory provisions governing DOD acquisition.

The DSMC task force conducted a key word search for acquisition-related terms in a FAR/DFARS data base. This data base cross-referenced statutory provisions to the implementing FAR/DFARS regulations. In addition, DSMC reviewed all fiscal legislation for acquisition-related statutory provisions. They considered the various executive orders that are frequently issued instead of legislation. At the same time, the task force conducted a literature search to determine some of the major acquisition problems resulting from difficulties with acquisition statutory provisions.

From these sources, the task force identified more than 850 statutory provisions for review under the provisions guiding the Advisory Panel. The approach used tried to minimize the possibility of missing any important statutory provisions. As a result, the task force identified many statutory provisions that were marginally related to the acquisition process. Subsequently, the Panel decided that action on many of these marginal statutory provisions would not specifically promote the objectives the Congress set forth. So the number of statutory provisions the Panel reviewed in depth was a lesser number.

Panel Operations

The Advisory Panel, under the direction of RADM Vincent, established a 3-tier arrangement to accomplish its objectives

Organization - Division of Labor

The Advisory Panel was the decision-making body. They met regularly to discuss the findings to date, review any recommendations the working groups brought forward, and select from various alternative recommended action.

The six working groups established by the Panel performed analysis and evaluations. They reviewed the research between Panel meetings and prepared recommendations for the Panel to review.

Rear Admiral Vincent established a task force at DSMC to support Panel efforts. The task force was primarily responsible for conducting the research to support each working group. In addition, the task force developed recommended operating procedures for the Panel. The task force was also responsible for all administrative functions associated with running a panel under the Federal Advisory Committees Act (FACA).

For the first 9 months, the Panel met about once a month. In June 1992, the Panel began meeting for an average of 3 days per month. Following this schedule, the Panel met its mandated completion date. They sent the final report to the USD(A). By January 15, 1993, the Secretary of Defense will transmit the final report to the Congress in accordance with the provision of Section 800 of the Authorization Act.

At the first meeting, the Panel established the boundaries of the study and established a scheme for subdividing the work (the six working groups previously defined). As a result, the task force categorized the statutory provisions by these working groups. Then, the working groups identified and prioritized their top areas of interest which are shown below:

—Contract Formation
—Competitive Statutory Provisions
—Truth in Negotiations Act
—Research and Development
—Procurement Protest
—Other Contract Formation Statutory Provisions

—Contract Administration
—Contract Payment
—Cost Principles
—Contract Audit and Access to Records
—Cost Accounting Standards
—Administration of Contract Provisions relating to Price, Delivery and
—Product Quality
—Claims and Disputes
—Extraordinary Contractual Relief

—Other DOD Acquisition Issues
—Major Systems
—Testing
—Service Specific
—Brooks Act/Warner Amendment
—Commercial Activities
—Industrial Base/ManTech
—Fuel
—Fiscal
—Miscellaneous

—Socioeconomic Issues
—Public Policy
—Simplified Acquisition Threshold
—Labor and Equal Opportunity
—Small and Disadvantaged Business Preferences
—Protection of the Environment
—Miscellaneous Socioeconomic Statutory Provisions

—Intellectual Property
—Technical Data
—Technology Transfer
—U.S. Competitiveness
—Patent Infringement

—Standards of Conduct
—Procurement Fraud
—Ethics
—Procurement Policy and Government Property
—Miscellaneous Standards of Conduct Statutory Provisions

Figure 1 indicates how the various statutory provisions were distributed among the working groups for their review.

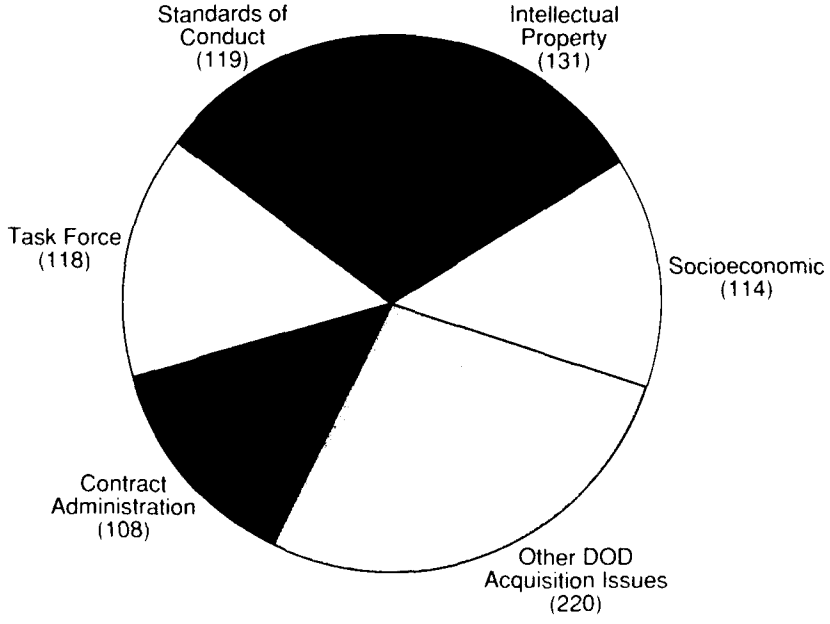
In support of the working groups, the task force prepared 92 legislative abstracts covering 181 statutory provisions. These abstracts describe congressional intent and identify major acquisition issues associated with the laws. In addition, the task force prepared five legislative histories for major legislative acts (i.e., TINA, CICA).

In reviewing the major statutory provisions, the working groups typically began the process with a legislative history and a literature search. Then, the working groups solicited comments from the acquisition community and other interested parties, often through the use of *Federal Register* notices or questionnaires. Specific inputs were obtained from departmental staffs, trade associations and governmental agencies with particular expertise, such as the Air Force Contract Law Center. Where appropriate, the working groups held hearings or other public meetings to ensure that a wide range of opinions was considered. These inputs were important in framing the working groups' specific recommendations to the Panel. Before making any decision on these recommendations, however, Panel members often asked their immediate staffs to coordinate comments from their own organizations. At the conclusion of its deliberations, the Panel reviewed *in toto* the tentative decisions reached throughout this review process. The purpose of this "last look" was to ensure that the individual decisions made over many months were consistent with one another—and with the Panel's goals and objectives.

Final Report

The Advisory Panel submitted its final report to USD(A). The Secretary of Defense will transmit the report to the Congress by January 15, 1993. He may attach any comments the administration feels are appropriate; however, the report is to be forwarded as written.

After the report is sent to the Congress, there will be another article in the *Program Manager* summarizing the conclusions and recommendations.



THE AMERICAN GOLDEN RULE: PAST AND PRESENT

John F. Leonard

Inside the Washington beltway, bureaucrats and politicians define the golden rule as "he who has the gold rules." He who has the gold in Washington is, in turn, defined by the annual federal budget. The annual budget has significant influence in determining where power rests in the bureaucracy.

In this century the budget has increased dramatically in complexity and controversy. For people in Defense Department acquisition, the budget and accompanying financial control system appear illogical, distracting and a necessary evil to get the job done. We pay attention because we know a favorable position in the budget is critical to continue and accomplish our mission. Erratic behavior and uncertainty of the budget process increases the cost of government acquisition and makes normal business planning nearly impossible for defense contractors. The process is difficult to deal with and wasteful. Why is the budget process like this?

The budget process developed incrementally. It has changed, becoming more complex as circumstance dictates and continues to change in response to conflicting political forces. A review of federal budget development will help us understand how we got where we are and what forces play in the budget process.

Mr. Leonard is a professor of engineering management, Integrative Program Management Department, at the Defense Systems Management College.

Founding and Forming Years

The golden rule of government and the struggle for dominance it implies is an American tradition. A basic contest over budgetary authority ignited colonial America, starting the Revolutionary War.[1] In the American colonies of the early 1770s, colonial legislatures determined and provided salaries and spending authority of the king's appointed governor and other officials. This gave the legislatures virtual control of the king's men. Parliament, in an attempt to break the power of colonial legislatures, passed the Stamp Act and tea taxes; money collected would be controlled by the English government and used for salaries and other activities of royal appointees. If these taxes were left to stand, the political power in America would have shifted from the colonial legislatures to the king's men. Unwilling to accept this, the colonial political leaders resisted, precipitating action that resulted in the Revolutionary War.

Independence resulted in a confederacy form of government for the new United States. That government was at the mercy of the states for spending funds, because it could not directly raise revenue to pay for its legitimate expenses.[2] Trying to control finances, the Congress established the post of Superintendent of Finance and, later, in 1784 a Treasury Board; but control was elusive without the power to tax. The Federalists exploited this weakness during the national debate concerning the proposed constitution for a federal government. Inescapable logic told them the right of a nation "to procure a regular and adequate supply of revenue" was "an indispensable ingredient in every constitution."[3]

Ineffectiveness of the Confederation and financial problems caused by the Revolutionary War led to adoption of the U.S. Constitution in 1789. Article I, Section 8, gives the Congress power to "lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defense and general welfare of the United States." The Constitution was the first milestone in developing the American budget process—for the first time the federal government had the power to collect taxes and decide how to spend them.

The first Congress saw the Treasury Department as a legislative agency; and, in fact, Secretary of the Treasury Alexander Hamilton operated as an officer of the Congress.[4] In his first two reports to the Congress, Hamilton recommended full funding of the national debt, assumption of the states' war debts, and a tax plan to pay for them. These reports started the never-ending American struggle regarding where the money comes from and how it will be spent. Hamilton's proposals were adopted, but not before he struck a deal with Tho-

mas Jefferson concerning location of the new capital city.

In the years between the first Congress and the Civil War, members of the Federalist Party and successors strived to support, with the use of protective tariffs, development of the new Union with roads, rivers, harbors, beacons, canals and other internal improvements. One successor, the Whigs, was a strong advocate of government spending to foster industrial expansion.

On the other hand, members of the Democratic-Republican Party (later called the Democratic Party) favored a balanced budget, lower tariffs to support Southern agriculture, and minimal government involvement in running the country's finances. This established a system whereby the Northern states, which wanted tariffs to protect emerging industry, and the Western states, which wanted internal improvements, were in conflict with the Southern states which wanted lower tariffs. In 1830 a protective tariff law was passed; it was so extreme that it was called the "Tariff of Abomination" by Southerners. South Carolina passed a law nullifying the tariff. To prevent a confrontation between state and federal forces, which President Jackson was ready to do, the Congress passed the Compromise Tariff of 1833 which reduced the offensive tariffs.

Another key part of the Democrats' budget philosophy was that government borrowing and resulting interest payments presented a clear case of redistribution of wealth from the poor to the rich. Deficit spending and government involvement in private finance was seen as a burden on the people, support to the rich and an influence that distorted the judgment of the Congress. Andrew Jackson's veto of the Bank Renewal Bill illustrates the Democrats' philosophy. His eloquent veto justification condemned the Bank of the United States not for its practical purpose but because it put much public money into pockets of men already made rich by the government-protected Bank of the United States.[3] Jackson and his Democrat followers believed this kind of governmental activity was contrary to the purpose of government, and it posed a danger to democracy.

With these competing forces in play in the early- and mid-1800s, the government had balanced budgets based on revenue, mostly from protective tariff. The Congress controlled taxing and the distribution processes through the Ways and Means Committee in the House and the Finance Committee in the Senate. The Treasury Department, in its role as agent of the Congress, supported both committees. The Congress appropriated funds on an annual basis and a line-item basis. The Executive Branch did, however, gain partial control of the budget when, in 1820 and 1842, the Congress passed laws allowing limited administration transfer of surplus funds from one account to another. At the outbreak of the Civil War, the process was stable and in congressional hands. Like other aspects of American life, the budget process underwent change during the Civil War.

It is interesting that the Constitution of the Confederate States prohibited protective tariffs and spending for internal improvements, items long fought against by Southern Democrats. The Confederate Constitution recognized the need for more administrative control by giving the president power to veto part of a bill without invalidating the whole bill. This gave Jefferson Davis, president of the Confederate States, the line-item veto, a significant budget power never given any U.S. President.

Legacy of Civil War

As the nation divided, President Abraham Lincoln assumed power of the purse and directed the Treasury Department to provide $2 million to the military. With the Congress adjourned, the president saw his actions as essential for national defense. Lincoln's action typifies how the war required the Executive Branch to be more flexible and timely in financial matters. War necessities forced the Congress to authorize "lump sum appropriation, spending in excess of authorization and appropriation, transfers, revolving funds perpetuated by reimbursements and more".[6] The administration gained flexibility to act with general, not specific, appropriation actions from the Congress.

For the first time, an income tax was levied by the Congress to help pay for the war; it accounted for 25 percent of

revenues in 1866. The tax expired in 1872, but the Supreme Court unanimously judged it constitutional in 1881 (Springer vs. United States).[7]

Finances of the war overwhelmed both the Ways and Means and the Finance Committees. At the end of the war, the Senate and the House formed Appropriations Committees to decide who would spend the public funds; former committees maintained responsibility for determining methods to generate revenues. The Appropriations Committees provided central-point control of most government spending (pensions and other permanent appropriations were under other committees).[8] As Appropriations Committees became more powerful they interfered with decisions of too many other committees. As a result, the Congress severely diminished their responsibilities and authority and spread the budget process among several committees.[9] Lack of central control eventually caused increased spending, deficits and cries for reform.

Emergence of Reform

In 1894, the Congress passed an income tax bill, reacting to low revenues from the 1893 depression, from increased government spending, and from a rising populist sentiment. Before the tax went into effect, it was declared unconstitutional. Ignoring the precedent of Springer vs. United States, the Supreme Court declared all income tax to be direct tax and, therefore, unconstitutional unless levied among the States according to population.[10]

Costs of being an emerging world power were more than traditional methods of taxation could handle. In 11 of 17 years between 1894 and 1911, the budget showed a deficit, created mostly by the Spanish American War and the Panama Canal.[11] This trend was seen as alarming and resulted in the Congress passing the single-sentence 16th Amendment in 1909. After ratification by the States in 1913, the federal government had unlimited power to "lay and collect taxes" from income, whatever the source.

Though revenues increased significantly, the new tax was insufficient to balance deficits caused by World War I. Between 1917 and 1919 the national debt grew from $1.2 billion to $25.5 billion.[12] The Congress needed a new solution to control and reduce government spending. Some reformers, like William Willoughby, saw the answer in an executive budget controlled by a central budget office under the president.[13] Others saw it in the return of strong Appropriation Committees. The Congress decided to do both: establish an executive budget and to strengthen power of the Appropriation Committees. This mixed solution of strengthening both the executive and legislative powers resulted in the Budget and Accounting Act of 1921.

Second Major Milestone in Budget Development

The Act of 1921 was a fundamental change for the budgetary process. The president now had responsibility and power to send his recommended annual budget to the Congress. Though the Congress retained power to approve or modify the budget, for the first time the president became an official player in the budget process. Henceforth, the process would start with the president's recommended budget; and he would control estimates given to the Congress.

Two agencies were established to support the new budget process: the Bureau of the Budget and the General Accounting Office (GAO). The GAO was established as an arm of the Congress to audit and account for expenditures, a role Treasury had since 1789.

The Bureau of the Budget supported the president in preparing his budget. The Bureau answered to the president and could call department heads into conference. It successfully insulated itself from Treasury Department control (though the Act had located it in Treasury).[14] The Bureau was the president's office for analyzing departmental requests. This new control of budget requests increased the president's direct control over the departments.

In 1920 and 1922, the Congress restored The Appropriations Committees to their former powers. During the good times of the 1920s, the Bureau of the Budget and The Appropriation Committees lessened government spending and appeared to be doing what they

were designed to do.[15] Then, the Depression hit.

Redefinition of Deficits: The Third Milestone

The Depression changed the economic culture. Deficits were not bad; they were the country's salvation. "The emphasis shifted from matching spending and revenue at the lowest possible level to manipulation of the difference between them."[16] Government spending increased, especially on social programs unique to American history. By the end of the 1930s, the major question for the Bureau of the Budget and the Appropriation Committees was asked by V.O. Key, Jr.: "On what basis shall it be decided to allocate x dollars to activity A instead of activity B?"[17] World War II interrupted consideration of the question.

During the war, there was no effort to control the budget; but, following it, balancing the budget again became a priority. Changes had occurred: the Budget Bureau grew from 40 personnel, when it was transferred to the Executive Office of the President in 1939, to 600 at the end of the war. The Full Employment Act of 1946 made it official: henceforth the federal government would be responsible for the nation's economy. Key's question was again being discussed, and some interesting solutions proposed.[18] The Bureau of the Budget continued to be dominated by competent, politically neutral experts.[19]

Spending levels were higher than before the war, but so were revenues. The war acclimated America to large budgets. During the Harry Truman, Dwight Eisenhower and John Kennedy presidencies the balanced budget and traditional budget process were largely maintained, though President Kennedy started a trend of small deficits.

The Political Budget Process

During the Lyndon Johnson administration, the Social Security fund was merged into the general revenue fund; the Bureau of the Budget management began to think they were not "political" enough; and the Programming, Planning, Budgeting System (PPBS) was directed to be used by all departments to prepare budget estimates. Social Security overwhelmed and distorted the budget, a condition still with us. The PPBS proved to be too complex to implement and is now used only by the Defense Department in a modified form.[20] The administration's experience with PPBS probably caused confusion and loss of traditional procedures.

Richard Nixon instituted Management By Objectives (MBO), oversaw transition of the Bureau of the Budget to the Office of Management and Budget (OMB), defied the Congress by impounding appropriated funds, and caused the emergence of a more political OMB. "The budget became a crucial battleground between Congress and the President, and the understandings upon which the executive budget had been based broke down."[21] The Congress reacted by passing the Congressional Budget and Impoundment Act of 1974, the fourth major milestone in developing the budget process.

The 1974 Act reorganized how the Congress approved appropriations and gave it an analytical capability by establishing the Congressional Budget Office (CBO). The CBO gave the Congress a new power it exercised in 1980 and 1982: the power to write their own budget if the president's does not suit them.[22] To fulfill responsibilities, the Congress felt it had to establish an agency within its direct control to provide a service that clearly, by Constitution and law, should have been provided by the Executive Branch.

Jimmy Carter brought zero-based budgeting to the budget process. It did not work well and was abandoned as MBO and PPBS were after Carter left office.

Gramm-Rudman-Hollings

During the Ronald Reagan presidency, one generally could count on a yearly budget struggle that resulted in an increasing deficit. To turn this trend, the Congress passed the Balanced Bud-

get and Emergency Deficit Control Act of 1984, better known as Gramm-Rudman-Hollings. Basically, it required automatic cuts in spending if OMB and CBO reviews showed the Congress deficit target was not being met. For various reasons, the law was generally ineffective in lowering deficits.[23]

In 1990, Gramm-Rudman-Hollings was replaced by the Budget Enforcement Act (BEA). This law allows higher deficits and future adjustments that considerably weaken the fight against the deficit.[24] It essentially accepts high deficits as legitimate budget policy but provides some restraint to how high the deficit can go. However, despite military spending below BEA limits, the BEA is in jeopardy. The Congress may modify or replace it in 1993 due to the sluggish economy.[25]

Proliferation of congressional committees and government agencies and the dichotomy of executive- and congressional-favored interest groups appear to establish more governmental "needs" than the country can pay for. Deficits are out of control and attempts to control them are easily thwarted.

The current national debt is $4 trillion, about $16,000 for each man, woman and child in the country.

Conclusion and Recommendations

The present budget crisis is reaching its pinnacle. The latest debt total is broadcasted by CBS weekly, showing the numbers climb rapidly as you watch. Ross Perot re-entered the presidential race because other candidates were not addressing the deficit issue to his satisfaction. The Brookings Institution declares the deficit a block to addressing national issues and providing capital to our industries.[26] The Washington Post declares the deficit to be "a calamity of historic proportions that could alter the destiny of the United States."[27]

Like the budget crisis of 100 years ago, ours today has reached the point where a dramatic solution must be used to solve the problem. History implies that a restructuring of the budget system is coming, one to establish clear congressional authority to replace that of the congressional committee, interest group and government agency triad. It is debatable when this restructuring will start; but the new Congress may be a reasonable guess, especially with the Democrats in the White House. It will be a painful, maybe fatal, process for interest groups, especially those associated with defense. The military budget is the largest discretionary funding block and probably will be assaulted, perhaps to unreasonable levels.

Cuts may not come in 1993 or 1994, but they will come. The last word is, "Be prepared."

Endnotes

1. Aaron Wildavsky, *The New Politics of the Budgetary Process*, (Glenview, Ill.: Scott, Foresman and Company, 1988) pp. 35-37.

2. *Articles of Confederation and Perpetual Union Between the States*, Article VIII. Article VIII states expenses "shall be defrayed out of a common treasury, which shall be supplied by the several states." There is no other source of funding given in the Articles of Confederation.

3. Alexander Hamilton, "Federalist No. 30," in Clinton Rossiter, ed., *The Federalist Papers*, (New York: Penquin Group, 1961); p. 188.

4. Jerry McCaffery, "The Development of Public Budgeting in the United States," in Ralph Clark Chandler, *A Centennial History of the American Administrative State*, (New York: Free Press, 1987); p. 356.

5. Jackson, Andrew, "Veto of the Bank Renewal Bill," in Richard Heffner, ed., *A Documentary History of the United States*, (New York: New American Library, 1965); pp. 91-100.

6. Lucius Wilmerding, quoted by Wildavsky, *The New Politics of the Budgetary Process*, p. 48.

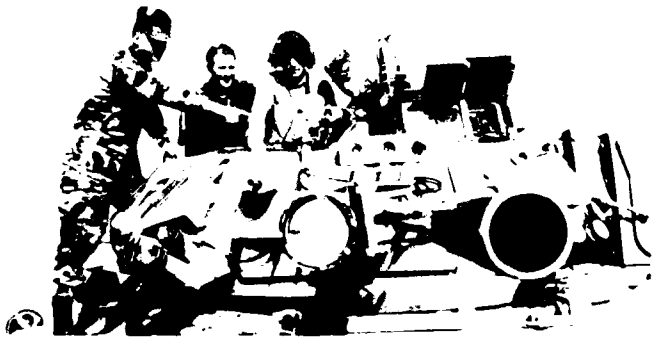
7. Alfred Kelly, Winfred Harbison, and Herman Belz, *The American Constitution: Its Origins and Development*, 6th ed., (New York: W. W. Norton and Company, 1983); 412.

8. Wildavsky, *The New Politics of the Budgetary Process*, 49.

9. McCaffery, 360.

10. Kelly *et al*, pp. 413-414.

11. McCaffery, 361.



Industry students receive briefing on the M-2 Bradley Fighting Vehicle at Fort Irwin, Calif.

Faculty and industry students learn about desert battle tactics at Fort Irwin, Calif.

RADM William F. Vercent (far right), PSMC Commandant, and Colonel Andrew A. Zaleski discuss F-14s maintenance with operational personnel at Nellis AFB, Nev.

Colonel Zaleski and industry student talk about F-15 electronic equipment at Nellis AFB, Nev.

12. Wildavsky, *The New Politics of the Budgetary Process*, p. 60.

3. William F. Willoughby, "The Movement for Budgetary Reform," in Jay Shafritz and Albert Hyde, *Classics of Public Administration*, 2nd ed., (Pacific Grove: Brooks Cole Publishing, 1987): 33-37.

14. McCaffery, 363.

15. Wildavsky, *The New Politics of the Budgetary Process*, pp. 62-63.

16. Aaron Wildavsky, "On the Balance of Budgetary Cultures," in Ralph Clark Chandler, *A Centennial History of the American Administrative State*, (New York: Free Press, 1987): p. 401.

17. V. O. Key, Jr., "The Lack of a Budgetary Theory," in Jay Shafritz and Albert Hyde, *Classics of Public Administration*, p. 117.

18. Verne B. Lewis, "Toward a Theory of Budgeting," in Jay Shafritz and Albert Hyde, *Classics of Public Administration*, p. 213. Lewis' recommendation for alternative estimates has, to my knowledge, never been treated seriously by the government but has potential for some programs where tradeoffs are a viable concern, for example, large military acquisitions.

19. McCaffery, 369.

20. Aaron Wildavsky, "Rescuing Policy Analysis from PPBS," in Jay Shafritz and Albert Hyde, *Classics*, pp. 370-385. Also see McCaffery, 368.

21. Naomi Caiden, "Paradox, Ambiguity, and Enigma: The Strange Case of the Executive Budget and the United States Constitution," *Public Administration Review*, 1:88 (January/February) 1987.

22. McCaffery, p. 370.

23. Mary Cohn, ed., *Congressional Quarterly's Guide to Congress*, 4th ed., (Washington: Congressional Quarterly Inc., 1991): p. 158.

24. Cohn, p. 159.

25. Robert Kieth, *Budget Enforcement in 1992*, Updated March 11, 1992, Congressional Research Service Issue Brief, Order Code IB92009, CRS-4.

26. Henry J. Aaron, *Setting National Priorities*, (Washington: The Brooking Institution, 1990): pp. 7-8.

27. Steven Mufson, "Debt Spree Leaves A Painful Legacy," *The Washington Post*, September 27, 1992: A1, A18.

PROCUREMENT OF MAJOR WEAPON SYSTEMS

Lieutenant Colonel Michael E. Heberling, USAF, Ph.D.

Major T. Scott Graham, USAF, Ph.D.

Many weapon system acquisition problems stem from the mistaken assumption that the defense industry operates in a free-market environment. Laws and regulations stressing competition mirror the commercial marketplace where there are many buyers and many sellers. The defense industry is, in reality, a monopsony that has many sellers and one buyer—the federal government. Game theory provides an alternative approach for analyzing major defense acquisitions based on actual conditions. It addresses the conflicting interests and options for the defense contractors and the government.

Defense Market

The defense industry is frequently the focus of criticism by news media, the Congress and the public for cost overruns and unethical business practices. Their performance is measured erroneously by the ideal standards of a free-market environment. Unfortunately, there is a major discrepancy between the defense market environment and the assumptions of our acquisition regulations. We base our procurement laws and procedures on the central theme of competition and a free market. This presupposes that:

1. No buyer or seller can influence price
2. There is easy entry and exit into the market
3. There is a supply-and-demand relationship
4. The marketplace determines profit with no essential relationship to cost.[1]

The realm of major system procurement is about as far from a free-market condition as one could imagine. In reality, the defense industry operates in an environment known as a monopsony. Here, there are many sellers (one will be successful) and one buyer (the federal government) which dictates total demand.

Entry into the defense market is difficult. There are numerous barriers such as unique reporting requirements, political considerations, federal regulations and security clearances.[2] The sheer sizes of the projects serve as a deterrent. Only a handful of companies would even contemplate such large projects as making a Nimitz class air-

FREE MARKET Small-Dollar Items	MONOPSONY Major Weapon Systems
Many Small Buyers	One Large Buyer (DOD)
Many Small Suppliers	Very Few, Large Suppliers
Large Quantities, Low Dollar	Small Quantity, High Dollar
Free Movement In/Out	Barriers to Entry/Exit
Prices Set by Marginal Costs and Utility	Prices Proportional to Total Costs; also Performance Requirements
	Dictate Costs
Labor Highly Mobile	Labor Not Mobile
Market Smoothly Reaches Equilibrium	Erratic Behavior Due to Budget Uncertainties
Market Shifts Rapidly	Extremely Long Market Development
Market Sets Prices	Buy-In to Available Budget

Lieutenant Colonel Heberling is head of the Graduate Acquisition Management Department at the Air Force Institute of Technology (AFIT).

Major Graham is the director of the Graduate Contract Management Program at AFIT.

craft carrier, an MX missile or a B-2 bomber.

Exit can be difficult. For example, defense work requires a large overhead. This makes the defense contractor's prices unattractive in the commercial marketplace. In addition, large investments in specialized equipment and personnel will tend to hinder easy conversion to the private sector.[3]

The business operations in the defense industry deviate significantly from conventional free-market theory.[4] All too often political considerations rather than price establish the elasticity of demand. In the defense market, the "invisible hand" of free-market forces and the notions of competition do not apply. Instead, we find what Peterson calls the "illusory hand" of political economics.[5]

Yet, in spite of the true monopsonistic nature of the defense industry, we continue to base legislation and regulatory guidance on free-market theory. According to Fox, "Neither the defense industry nor defense programs are governed by the free market; defense acquisition programs rarely offer incentives resembling those of the commercial marketplace."[6]

The professed goal is to stimulate and preserve a fully competitive setting for all DOD procurements. Laws based on the four assumptions of free markets (presented earlier) are appropriate for small-dollar items. However, the assumptions are not valid for major system acquisitions.[7]

Table 1, modified from Gansler,[8] presents the dichotomy of defense procurement. The table highlights some significant differences between free-market and major defense acquisition environments.

When we try to regulate the monopsonistic portion of the defense industry with laws based on free-market concepts, we must expect serious problems. The failure of the federal government to acknowledge the true nature of the defense industry is largely responsible for many of the scandalous procurement stories. These include buy-ins and cost overruns. As an alternative to the current treatment of major system acquisition, the government should consider the use of game theory in the selection process. This approach accommodates the monopsonistic nature of major acquisitions. It acknowledges the nonmarket forces that actually govern the process.

Background on Major Weapon System Acquisition

The general perception is that competition will afford the government the lowest-priced, highest-quality goods and services. However, competition has a negative side. Many defense contractors feel compelled to submit bids below cost in an attempt to buy into government programs.[9]

Firms will buy in for several reasons. When a firm is willing to accept a loss because it expects to recoup in the commercial market, this is an accepted practice. The General Accounting Office (GAO) regards a below-cost offer a boon to the taxpayer.[10] However, when the defense contractor intends to shift the underpricing back to the government during contract performance, the practice becomes illegal.

Former Deputy Assistant Secretary of Defense Jacques Gansler summarizes the situation: "Each firm is required to bid unrealistically low, since the whole issue is winning. Only large multibillion dollar firms can afford to play this game. History has shown that such an auction leads inevitably to program cost growth. The winner—now the only supplier—begins to encourage technical or program changes. The firm then prices these changes on a noncompetitive basis."[11]

Firms that win through the buy-in process expect to recoup their losses in one of two ways. The first method is through unnecessary or excessively priced changes after award. Follow-on contracts provide the other vehicle. Lucrative profits are now possible with no threat from competition. Buying in inevitably leads to cost growth. When this occurs, the government faces a dilemma. The options to address this problem include:

—Increasing the funding
—Reducing the quantities
—Canceling the program.

It becomes obvious that the expected benefits of competition do not appear. Problems result because the major systems portion of the defense industry does not operate in a free-market environment. Enacting more stringent legislation (again erroneously based on free-market assumptions) to rectify the situation will prove equally unsuccessful.

Game Theory as an Alternative

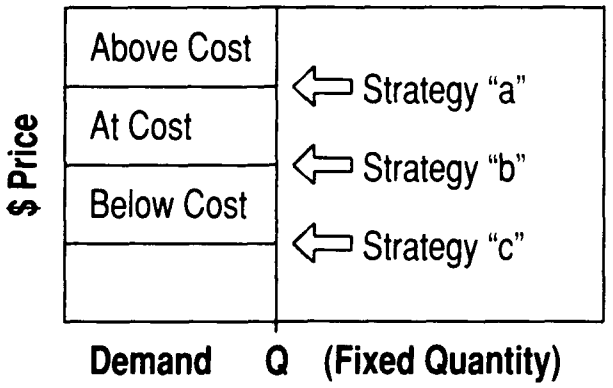
Game theory considers the actions of two or more parties, each having conflicting interests. They can take

actions independently in choosing one or two alternatives. The outcomes (or payoffs) are usually displayed in a matrix. This represents the possible combinations of their individual choices.[12]

To analyze competitive situations, game theory requires a three-step procedure. These steps include:

—Understanding strategies open to each player. This is usually accomplished by displaying the information in a matrix.
—Understanding how well-off each of you will be for all combinations of strategies.
—Analyzing options to determine the preferred course of action. This decision must account for the most likely strategy of each opposing player.

The literature on game theory rarely considers the buyer as a player. This situation occurs because the monopsonistic condition, where one buyer dominates, is rare in the commercial marketplace. Game theory literature tends to focus on the oligopolistic case, where there are several producers and numerous buyers. Consequently, individual buyers will have little influence on an oligopolistic firm. This is not the case in major defense systems acquisition. In the defense monopsonistic case, the buyer does have a major influence. Consequently, when game theory is applied to the defense industry, it must address the influence of the government as well. In the procurement of major weapon systems, the actions of the defense contractors are influenced in two ways. The first and most obvious source comes from other competing contractors. However, each contractor is also influenced by how the government acts or fails to act.



In modeling the defense procurement environment using game theory criteria, we can make several assumptions. These include:

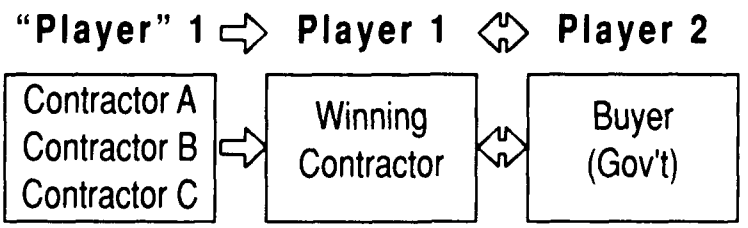
—*Noncooperative nature*—Because this is a winner-take-all situation, collusion is not a factor.
—*Rationality*—On the part of all the contractors and the government buyer.
—*Intelligence*—Each competing firm recognizes that the other firms and the buyer are rational.
—*Incomplete information*—A case could be made for complete or incomplete information; however, using Moothy's criteria, the incomplete information case best applies:
  —Firms do not know the motivations of their competitors
  —Firms often do not know the technological capabilities of their competitors
  —Firms differ in their knowledge of the world.[13]
—*Fixed demand*—The government fixes the quantity.
—*Number of moves*—There is only one move in this game, and all firms move at the same time. The winner of the first move ends the game.
—*Player objective*—The goal of each defense contractor is to win. This can occur above cost, at cost or below cost. Obviously, each contractor prefers a pricing strategy above cost. We can collectively consider all competing firms as one player in the game. The government's goal, as the other player, is to have a winner that selects either the above-cost or at-cost strategy. The government wants to avoid the unrealistic and risky low-pricing strategy of buy-ins. The buyer is neutral on which competing firm wins the contract.

Rules of the Game

With the assumptions established, we can now look at factors influencing pricing strategy. Contractors will base their pricing strategy on the expected actions of their competition. To win, a contractor must undercut all competition. This is a winner-take-all game where market share is not a factor. Since the contractor is rational and intelligent, he will pursue the same strategy. The question then becomes how low will each contractor be willing to go below cost to win.

In the case on defense contracting, the pricing level is frequently a function of the behavior by the government buyer.

Therefore, we must view the government as another player in this game. To date, its official position has been to play a passive role, assuming "competition in a free market" will yield the best results. Unfortunately, this frequently results in buy-ins. Not only is there no pen-



alty when this occurs, but contractors are frequently rewarded.

Contractors will only bid below cost when they feel they can recoup losses. This will occur through changes in the scope of the work or with follow-on contracts. To minimize this option, the government can do the following:

—Strive to have firm, well-established specifications before contract award. Vague specifications lead to numerous and potentially overpriced changes.
—Limit the use of noncompetitive, follow-on contracts. Price the primary contract and the follow-on contracts together and adhere to these agreements after award.

Contractors may not perceive the government has changed "the rules of the game," at least in the short run. However, recent cancellation of the Navy A-12 Avenger II program shows the Defense Department will no longer operate on a business-as-usual basis. After a $3.1 billion investment, this was the largest and most costly weapons program ever canceled.[14] This action shows the government can be an active player in the weapons system acquisition game.

The government has other options that can prevent or at least lessen the negative effects of underbidding. As an illustration of the problem with the current system, consider the case where there are three firms seeking a major weapons contract. All three are technically capable of doing the work. However, Firm "A" has no work in the near future; its only major contract will finish in four months. If this firm doesn't get this contract, it will be forced to lay off core engineers as well as many of its most experienced workers.

The government correctly assumes Firm A will be the one most likely to buy in. The government also knows the other firms, "B" and "C," are aware of this fact. Since there are no second chances for bidding, each contractor will base his bid on what he expects the other contractors to do. All positioning and estimating are done independently by each firm before the actual bid. As stated earlier, since this is a winner-take-all award, collusion is not in the interest of any of the firms.

Competitor's Pricing Strategy

Firm "A"	Above Cost	At Cost	Below Cost
Above Cost	?	Lose	Lose
At Cost	Win	?	Lose
Below Cost	Win	Win	?

The results from estimating options are three bids, all below cost. Firm A will be far below cost. Ironically, federal law does not allow for the exclusion of a bidder based on a price that is below the government's estimate.[15] Even though the government knows that a buy-in occurred, Firm A will get the contract. This illustration parallels a real case. In the early 1980s, the Air Force needed a replacement for the aging T-37 trainer aircraft. The T-46 could be built by a number of aircraft manufacturing companies. One of these was the Fairchild Republic Company. Fairchild needed this contract. They were about to deliver their last A-10 Thunderbolt II ("Warthog") aircraft, and they had no other major contracts. Their cost proposal was low. Fairchild won the contract. However, almost immediately they had problems. The $3.0 billion, 650 aircraft T-46 program was canceled in 1986 after four years of work and an investment of $600 million. The reasons cited were poor performance, schedule delays and cost overruns.[16]

In this example, applying free-market assumptions to a monopsony had tragic results. In the case of the T-46, everyone lost—the Air Force, Fairchild Republic and the taxpayers. Using the principles of game theory, the outcome was very predictable. This example shows that it is in the government's best interest to be a player in the major weapon system acquisition game.

Admiral Hyman G. Rickover suggested an alternative that has interesting game theory implications. He suggested the contract award should go to the second low bidder when a buy-in occurs. This determination could be made based on a "should cost" estimate or through some other means.

Under these conditions the strategies for each con-

tractor would change. It is no longer a viable option to take the suicidal dive below cost in their proposals. Each contractor is now playing against the other contractors and the unknown government estimate. Although it might be somewhat nebulous, there is a lower limit for the cost proposals. He wants to be below his competition but above the government estimate. Under these conditions, there is no incentive to underbid; in fact, it could be detrimental to his chance of winning. The contractor now has only two viable pricing strategies: bidding above cost or bidding at cost. The elimination of the below-cost strategy for all players illustrates the dominance rule of game theory. If one or more strategy is always superior to another, the "dominated" strategy may be eliminated from the matrix.[17] In Figure 4, the three-by-three matrix would result in a simpler and desirable two-by-two matrix for contractors and the government.

Conclusion

By using game theory to solve the major acquisition sourcing problem, all parties are better off. The competing contractors will be far less likely to buy in. This, in turn, reduces the probability of a cost overrun. The budgeting process will be more accurate, and the entire program will be more stable.

Game theory helps solve the major system acquisition problem based on the actual monopsonistic market conditions. Our present acquisition legislation and regulatory guidance perpetuates the mistaken belief that the defense industry operates in a free-market environment.

Game theory may prove useful in other types of government acquisition as well. For example, dual sourcing with a guaranteed share for each player adds the element of potential collusion to the game.

Competitor's "B" "C" Pricing Strategy

Firm "A"	Above Cost B1/C1	At Cost B2/C2	Below Cost B3/C3
Above Cost A1	?	Lose	No Longer Feasible
At Cost A2	Win	?	No Longer Feasible
Below Cost A3	No Longer Feasible	No Longer Feasible	No Longer Feasible

Endnotes

1. Michael N. Beltramo, "Is Competition Hurting Technology?" *Military Logistics Forum*, October 1987, pp. 42–46.

2. Jacques S. Gansler, *The Defense Industry*, Cambridge, Mass., The MIT Press, 1980, p. 46.

3. Ibid.

4. Ibid., p. 1.

5. Blair A. Peterson, "The Defense Industry: An Illusion of a Free Market," *National Contract Management Journal*, Vol. 20, Winter 1987, pp. 105–112.

6. J. Ronald Fox, *The Defense Management Challenge*, Boston, Mass., Harvard Business School Press, 1988, p. 300.

7. Peterson, p. 106.

8. Jacques S. Gansler, *Affording Defense*, Cambridge, Mass., The MIT Press, 1989, p. 159.

9. Prospere S. Virden and James P. Gallatin, "Buying-In: The Downside of Competition," *Contract Management*, November 1984, pp. 5–7.

10. Ibid., p. 6.

11. Ibid.

12. Roy J. Lewicki and Joseph A. Litterer, *Negotiation*, Homewood, Ill., Irwin, 1985, p. 35.

13. K. S. Moothy, "Using Game Theory to Model Competition," *Journal of Marketing Research*, Vol. XXII, August 1985, pp. 262–282.

14. David C. Morrison, "Deep-Sixing the A-12," *Government Executive*, March 1991, p. 30.

15. Virden and Gallatin, p. 76.

16. David M. North, "Congressional Impasse on T-46 Prompts NGT Recompetition," *Aviation Week & Space Technology*, October 27, 1986, p. 16.

17. J. D. Williams, *The Compleat Strategyst*, New York, McGraw-Hill, 1966, pp. 67–68.

1992 PM Articles

January-February

- An Innovative Producibility Strategy—Dr. Robert E. Schafrik and Mr. Greg Stottlemyer, p. 2.
- Electromagnetic Compatibility—LtCol Richard Hayes, USAF, and Bruce Hall, p. 10.
- Two Processes—Major James W. Wilson, Jr., USA, p. 16.
- Acquisition, Development and Test Strategies—LtCol Anthony F. Shumskas, USAF, p. 22.
- Life-Cycle Instrumentation—Michael J. O'Connor, p. 28.
- Keeping the Edge—Major Charles R. Nelson, USAF, p. 32.

March-April

- Long Lead Item Process Management—William R. Fournier, p. 4.
- Not Just Smoke and Mirrors—Dr. A. N. Hafner, p. 6.
- Improving the R&D Process in the Defense Technology Base—Colonel Joseph L. Bergantz, USA, p. 10.
- Cost Discounting and The Production Stretch-Out Decision—William C. Miller, p. 16.
- A Perspective on Future Test and Evaluation in the Department of Defense—John D. Claxton, p. 20.
- TQM from the Trenches—The Role of the Individual—Rolf Clark, p. 28.

May-June

- Is There Going to Be a High-Tech Air Force in the Future?—LTC John A. Rolando, USAF, p. 2.
- Rebuilding the U.S. Industrial Base—Lawrence E. Briskin, p. 8.
- Acquisition Systems Protection—Edward P. Casey, p. 14.
- Certification In Your Career Path—Dr. Julius Hein, P.E., p. 21.
- Challenges Ahead, Future Roles Defined—The Honorable David S. Chu, p. 24.
- The Acquisition Program Baseline—Charles B. Cochrane and William E. Bahnmaier, p. 28.
- Thinking Through a Complex Issue—Robert A. Warren, p. 32.
- Program Management Is A Team Sport—Owen C. Gadeken, p. 35.

July-August

- How to Organize for Concurrent Engineering—John R. Snoderly, p. 2.
- Educational Entrepreneurs—J. W. Gould III, p. 14.
- A Toolkit for Program Management Architects—Joseph R. Zaleski, p. 22.
- A Risk Management Approach to Cost Estimating—Bernard H. Rudwick, P.E., p. 29.
- DOD New Acquisition Approach—C. B. Cochrane, p. 38.
- DSMC—A DOD Agent for Change—Edward Hirsch, Brigadier General, U.S. Army (ret.), p. 47.
- Commercial Practices for Defense Acquisition Guidebook—Calvin Brown, p. 50.
- Space Policy Considerations for Technical Acquisition Personnel—Major Vernon Dale Jones, USAF, p. 52.

September-October

- Successful Bar Code Management in the U.S. Air Force—Wayne D. Kirk, p. 2.
- Rapid Response Process—Captain Scott A. Dalrymple, USAF, p. 4.
- Testing in the Era of Expedited Development—Dr. A. N. Hafner, p. 10.
- Design Reviews—Commander R. Kenneth Crowe, USN (ret.), p. 12.
- Best Value Contracting—Janice M. Menker, p. 16.
- Negotiation of International Cooperative Defense Acquisition Management—Richard Kwatnoski, p. 20.
- Where Have all the Leaders Gone?—Major Dennis Drayer, USAF, p. 26.

November-December

- Cutting a Path to Quality through Concurrent Teamwork—William N. Maher, p. 2.
- Manufacturing Notes—William T. Motley, p. 8.
- Results-Oriented Program Management as a Leadership/Management Model—James E. Price and Mary-Blair Valentine, p. 12.
- Organization Development—Major Jim Wilson, USA, p. 18.
- The Software Development Process—Captain Jeanne L. Murtagh, USAF, p. 22.
- Lessons Learned in Manufacturing Modernization—Dr. Robert E. Schafrik and Dr. Thomas D. Fiorino, p. 28.
- The Army Reuse Center—Cost Avoidance through Software Reuse—Marrea Riggs, p. 36.
- Evolutionary Acquisition and DOD's Revised Acquisition Strategy—Edward Hirsch, Brigadier General, U.S. Army (ret.), USA, p. 38.

LEAN PRODUCTION

Lieutenant Colonel Leslie Anderson, USAF

Lean production is a new production concept developed in Japan, by Toyota and others, that uses less of everything compared to classic mass production—half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. It is described in, *The Machine That Changed the World*, which summarizes the Massachusetts Institute of Technology-led International Motor Vehicle Program Study of the worldwide auto industry.

The five dimensions to lean production are: running the factory, designing the product, managing the supply chain, dealing with the customers, and managing the enterprise. This paper will address the first three.

	GM Framingham	Toyota Takaoka
Gross Assembly Hours per Car	40.7	18.0
Adjusted Assembly Hours per Car	31.0	16.0
Assembly Defects per 100 Cars	130 .0	45.0
Assembly Space per Car	8.1	4.8
Inventories of Parts (average)	2 weeks	2 hours

Note:
Gross Assembly Hours per Car are calculated by dividing total hours of effort in the plant by the total number of cars produced.
Adjusted Assembly Hours per Car incorporates the adjustments in standard activities and product attributes described in the text.
Assembly Defects per 100 Cars were estimated from the J. D. Power initial Quality Survey for 1987.
Assembly Space per Car is square feet per vehicle per year, corrected for vehicle size.
Inventories are a rough average for major parts.

Source: IMVP World Assembly Plant Survey

Running the Factory

Classic mass production has certain characteristics that are different from lean production. The work has been arranged so the assembly worker has only a few well-defined tasks to master, requiring only limited training, and then he is relentlessly disciplined by the pace of the assembly line. Indirect specialists provide industrial engineering, manufacturing engineering, quality inspection, housekeeping, maintenance of equipment and tools, and rework. The equipment used to fabricate parts is highly accurate, specialized and designed for high volume. Set-up time is minimized because the same equipment produces the same part for extended periods of time. A limited number of products are produced in high volume. Each step in the production process is buffered from the other steps by excess capacity, large volumes of work in process, and extra people to prevent disruptions. A lean producer transfers the maximum number of tasks and responsibilities to workers actually adding value to the product on the line. Many indirect specialists either go away or exist in greatly reduced numbers. A lean producer has also developed a quality system that quickly traces each problem, once discovered, to its ultimate cause. To do this, they employ teams of multiskilled workers at all levels of the organization and use highly flexible machines to produce a great variety of products. See Figures 1 and 2 for a summary of pertinent indices. Note especially the differences in training provided. The best Ford facilities are able to approach the best Japanese lean producers, but only with a focused facility that has a reduced vehicle mix to produce.

Designing the Product

There are four basic differences in the design methods employed by mass

Lieutenant Colonel Anderson is a professor of manufacturing management, Manufacturing Management Department, Defense Systems Management College.

and lean producers. See Figure 3 for some pertinent performance indices. Japanese producers run on a 4-year product development cycle, but their new target for product development is 24 months.

—*Leadership*. In the best lean producers, the project team leader position carries great power and prestige. It is a stepping stone to higher management. The team members work directly for him and top management restrains itself from overriding him. He is assigned for the duration of the project and is often personally identified with the final product.

—*Teamwork*. Product development teams are small, tightly knit groups assigned to the team for the project duration. The team leader controls their evaluations and their next assignment, which is usually to another product development team. Advancement is through demonstrated performance on multifunctional teams rather than functional specialization.

—*Communication*. The team leader's job is to force the group to confront all the difficult trade-offs they must make to come to agreement on the project at the beginning of the development process. Once the team has agreed to the critical design trade-offs, there is little inclination to reopen the decision unless a major change has occurred. This results in a large team at the beginning of the process, which then shrinks as some specialties are no longer needed. Mass producers start with small teams that are then augmented to resolve the problems that could have been cleared up at the beginning. Another impact is caused by the shuffling of functional specialists from the team to other projects and the resultant need for the new guy to come up to speed on the program.

—*Simultaneous Development*. The product and the manufacturing processes are developed at the same time. This allows an early start on tool development and the ability to address producibility considerations earlier in the process and in a face-to-face manner within the team rather than department vs. department position papers requiring top-management intervention.

	Japanese in Japan	Japanese in N.Amer.	Amer.in N.Amer.	All Europe
Performance:				
Productivity (hours/veh.)	16.8	21.2	25.1	36.2
Quality (assembly defects/ 100 vehicles)	60.0	65.0	82.3	97.0
Layout:				
Space (sq. ft./veh./year)	5.7	9.1	7.8	7.3
Size of Repair Area (as percent of assembly space)	4.1	4.9	12.9	14.4
Inventories (days for eight sample parts)	.2	1.6	2.9	2.0
Work Force:				
Percent of Work Force in Teams	69.3	71.3	17.3	.6
Job Rotation (0 = none, 4 = frequent)	3.0	2.7	.9	1.9
Suggestions/Employee	61.6	1.4	.4	.4
Number of Job Classes	11.9	8.7	67.1	14.8
Training of New Production Workers (hours)	380.3	370.0	46.4	173.3
Absenteeism	5.0	4.8	11.7	12.1
Automation:				
Welding (percent if direct steps)	86.2	85.0	76.2	76.6
Painting (percent of direct steps)	54.6	40.7	33.6	38.2
Assembly (percent if direct steps)	1.7	1.1	1.2	3.1

Source: IMVP World Assembly Plant Survey, 1989; J.D. Power Initial Quality Survey, 1989.

Managing the Supply Chain

The lean producer deals with his supplier base in a different manner than most mass producers. One of the most striking characteristics is a smaller supplier base (hundreds rather than thousands). In addition, the suppliers provide much of the engineering after being given a performance specification. In some cases, they are part of the product development team that develops the specifications. Pricing of their pieces is value-based rather than cost-based. That is, the supplier and prime start with a target price for a product and work through the Work Breakdown Structure to develop cost targets for each piece. Then, they use value engineering and value analysis techniques to reach a design that will meet the cost target, while still allowing the supplier his negotiated profit margin. Future-year buys are priced using an aggressive price improvement curve with any additional savings going to

the supplier. This is different than the arms-length business arrangements typically followed by the mass producers. It may partially explain how Toyota is able to buy 70 percent of the content of its four million vehicles produced yearly with only 337 people in parts purchasing; General Motors, with a 30 percent buy ratio and double the volume, needs 6,000 people.

Conclusion

Lean production techniques allow a manufacturer to offer a broader product mix, updated more frequently, at the same or lower costs than traditional mass-production techniques. However, the transition from mass-production to lean production is not painless or fast. To quote an unnamed Toyota source, "We believe that our production system, with its many nuances, can be learned by anyone...but it takes ten years of practice under expert guidance."

	Japanese Producers	American Producers	European Volume Producers	European Specialist Producers
Average Engineering Hours per New Car (millions)	1.7	3.1	2.9	3.1
Average Development Time per New Car (in months)	46.2	60.4	57.3	59.9
Number of Employees in Project Team	485	903	904	
Number of Body Types per New Car	2.3	1.7	2.7	1.3
Average Ratio of Shared Parts	18%	38%	28%	30%
Supplier Share of Engineering	51%	14%	37%	32%
Engineering Change Cost as Share of Total Die Cost	10-20%	30-50%	10-30%	
Ratio of Delayed Products	1 in 6	1 in 2	1 in 3	
Die Development Time (months)	13.8	25.0	28.0	
Prototype Lead Time (months)	6.2	12.4	10.9	
Time from Production Start to First Sale (months)	1	4	2	
Return to Normal Productivity after New Model (months)	4	5	12	
Return to Normal Quality after New Model (months)	1.4	11	12	

Source: Kim B. Clark, Takahiro Fujimoto, and W. Bruce Chew, "Product Development in the World Auto Industry," Brookings Papers on Economic Activity, No. 3, 1987; and Takahiro Fujimoto, "Organizations for Effective Product Development: The Case of the Global Motor Industry," Ph.D. Thesis, Harvard Business School, 1989, Tables 7.1, 7.4 and 7.8.

FROM THE OFFICE OF THE COMMANDANT

The Defense Systems Management College (DSMC) is moving into 1993 with a sense of excitement and uncertainty that I am sure is affecting many Program Manager (PM) readers. Our country is operating with a new vision regarding involvement in world security issues. Although immature, this vision is being tested frequently in far-off places such as Somalia and what used to be Yugoslavia. More well-defined is the state of the deficit and the future it portends for the defense budget. We have a new administration, whose approach to issues stemming from the above will undoubtedly hold suprises for all of us in the defense acquisition business. So what bold forecasts can I offer in this first PM issue of 1993?

First, there will be a movement to reduce legislative barriers to procurement of commercial items. As many of you know, I chaired a panel that carried out an 18-month effort to review defense acquisition legislation and make recommendations to the Congress to streamline the acquisition process. Our panel made numerous recommendations for change but focused a great deal of effort on the means by which legislative change could reduce barriers to procurement of commercial items. We recommended establishement of an entirely new subchapter in Title 10, which would clarify and broaden definitions of commercial items and exempt procurement of these items from many socioeconomic laws. This would clearly encourage producers of commercial equipment to offer their products to government programs at competitive prices. These recommendations are in harmony with a large body of opinion on all sides that foresee significant savings to the government if more procurements of this nature are used.

Secondly, I see no downturn in the need for high-quality education in the defense acquisition field. With the maturation of the Defense Acquisition Work Force comes the clear identification of competencies needed for the functional areas of the work force. This, in turn, leads to a definition of the curriculum needed to meet needs of the individual as he or she progresses through the three levels of qualification. This also has caused more courses to be assigned as mandatory for the career acquisition professional; and, therefore, the demands placed on defense acquisition educational institutions, like DSMC, are increasing. We are eager to address this challenge and continue to provide quality education in an affordable way.

Lastly, there will be increasing demands placed on weapon system acquisition professionals to perform with fewer resources. We offer our college as a resource to help you attack this challenge. My faculty and staff are committed to help make our acquisition work force a more capable team and will pursue all avenues to help you accomplish this. Happy New Year.

—RADM William L. Vincent, USN.